

App. No. 10/812,747
Amendment dated October 10, 2006
Reply to Office action of May 8, 2006

Amendments to the Drawings:

The attached drawing sheets include changes to Fig. 1, Fig. 3, and Fig. 4. These sheets replace the original sheets containing Figs. 1, 3 and 4.

In Fig. 1, the terms designating the subunits of control device 20 have been revised.

In Fig. 3, reference numerals "21" and "22" have been corrected to "31" and "32."

In Fig. 4, the units that had been missing after the items "Unevenness" and "Hole sidewall angle" have been indicated.

Attachments: Replacement Sheets
 Annotated Sheets Showing Changes

REMARKS

Summary of Amendments

The specification has been amended as requisite to addressing the first § 112 rejection of claims 15-18. In addition, the specification has been amended to remove all mention of "means" from the Detailed Description section. Finally, the specification has also been amended to accord with a correction made to Fig. 3.

Claims 1-14 are withdrawn. Claims 15-24 each have been amended to address, in the first place, the § 103 rejections of these claims, by extensively revising the claims to incorporate concrete structural elements and limitations so as to positively set forth the distinguishing features of a silicon substrate etching device according to the present invention. At the same time, these amendments address the § 112 rejections of these claims.

Support for Amendment

Support for the amendment to the paragraph beginning at page 15, line 15 (paragraph [0056] in the published version) of the specification can be found in Fig. 2(a) and 2(b), and in the last phrase in claim 19 as originally filed, which read,

said gas flow controlling means is formed so that said etching gas and said protective film forming gas are continuously supplied to said etching chamber while flows thereof are periodically changed, with said flows being controlled so that phases thereof are opposite of each other.

Drawings

Drawing replacement sheets attached to this paper revise the names of the subunits of control device 20 in Fig. 1 to remove the references to "means," in Fig. 3 correct a duplicate usage of reference numerals, and in Fig. 4 add the indication of units missing next to two items in the chart.

Claim Rejections - 35 U.S.C. § 112

Five rejections were made under this section. Each is addressed below.

- (1) Claims 15-18 were rejected under § 112, first paragraph, for failing to comply with the written description requirement in reciting "means for reducing pressure." It is believed that the problem was owing to the specification appearing not to have provided a description of the structure corresponding to this claimed means.

The specification has been amended to correct the description of "decompression unit 13" to, "pressure-reduction unit 13," so as to clarify what was intended to be the corresponding structure. Moreover, in claim 15, the recitation of means for reducing pressure" has been amended to, "pressure-reduction unit."

While it is noted that original independent claims 19, 22 and 24 also recited "means for reducing pressure," and might likewise have been rejected, it is believed that this rejection of 15, and therefore of its dependent claims 16-18, has been overcome.

- (2) Claims 15-24 were rejected under § 112, first paragraph, for being based on an unenabling disclosure. The Office asks, "How do the algorithms and logic claimed . . . control/alter/influence the claimed apparatus parts?"

Claim 15 has been amended to recite

a gas flow controller connected to said mass-flow controllers in said gas-supply unit, said gas flow controller configured to control said mass-flow controllers so that said gas-supply unit delivers the etching gas into said etching chamber at an intermittent flow obeying a predetermined rectangular waveform varying between zero and a predetermined value, and delivers the protective-film-forming gas into said etching chamber at a continuous flow.

Claim 19 has been amended to recite

a gas flow controller connected to said mass-flow controllers in said gas-supply unit, said gas flow control means configured to control said mass-flow controllers so that said gas-supply unit delivers the etching gas into said etching chamber at a volume-variant flow obeying a first predetermined rectangular waveform, and delivers the protective-film-forming gas into said etching chamber at a volume-variant flow obeying a second predetermined rectangular waveform whose phase is the inverse of that of said first predetermined rectangular waveform.

Similarly, claims 22 and 24 have each been amended to recite

a gas flow controller connected to said mass-flow controllers in said gas-supply unit, said gas flow controller configured to control said mass-flow controllers so that said gas-supply unit delivers the etching gas into said etching chamber at a first predetermined flow, and delivers the protective-film-forming gas into said etching chamber at a second predetermined flow.

It is respectfully submitted that reciting a "gas flow controller *configured to control*" mass-flow controllers in the special way recited is enabling to a person skilled in the art, because a person skilled in the art would understand from the claim language that the inventive gas-flow controller may be embodied by, for example, especially configured CPU logic in the gas-flow controller, or by a computer-readable medium containing a program that causes computer circuitry in the gas-flow controller to execute control functions that are special features of the present invention.

Accordingly, it is believed that this rejection has been overcome.

- (3) Claims 15-24 were rejected under § 112, second paragraph, as being incomplete for omitting essential elements. It is believed that the amendments summarized and described at (2) above fully address, and overcome, this rejection, in particular because the claims as now amended clearly set forth the interoperation of the claimed gas flow controller the mass-flow controllers, and recite that the gas flow controller is *configured to* carry out, in the Office's words, the "algorithms and logic" unique to the present invention.

Accordingly, it is believed that this rejection has been overcome.

- (4) Claims 15-24 were rejected under § 112, second paragraph, as being incomplete for omitting essential steps. It is believed that the amendments summarized and described at (2) above fully address, and overcome, this rejection, in particular because the claims as now amended neither recite "means," nor use language so functional as to read like method or "recipe" steps.

Accordingly, it is believed that this rejection has been overcome.

- (5) Claims 15-18 were rejected under § 112, second paragraph, for indefiniteness in the recitation of "means for applying high-frequency electrical base power." This editorial anomaly has been corrected by revising this claim-15 recitation to read, "a second RF power supply for applying high-frequency power."

Accordingly, it is believed that this rejection has been overcome.

Rejections under 35 U.S.C. § 103

Claims 15-24; Ishii '942 in view of holding regarding intended use

Claims 15-24 stand rejected as being unpatentable under 35 U.S.C. § 103(a) over U.S. Pat. No. 5,685,942 to Ishii, in view of the Office's holding that functional language ending the independent claims as filed amounts to recitations of intended use.

The lengthy rejections here under section 10 of the Office action begin with independent claim 15. This claim is broken down into the recited elements, each of which was originally recited as a "means," the "means" recitations are matched to corresponding material described in the specification, then passages that are alleged to teach that material are quoted from Ishii. For independent claim 15, this process is repeated for each of the claim elements, as individually addressed in subsections i.-viii.

Finally, the rejection of claim 15 concludes by addressing the recitation appearing after "wherein" in the original claim. The Office states,

[I]n apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior-art structure is capable of performing the intended use, then it meets the claim.

Claim 15 as been amended to recite

a gas flow controller connected to said mass-flow controllers in said gas-supply unit, said gas flow controller configured to control said mass-flow controllers so that said gas-supply unit delivers the etching gas into said etching chamber at an intermittent flow obeying a predetermined rectangular waveform varying between zero and a predetermined value, and delivers the protective-film-forming gas into said etching chamber at a continuous flow.

It is respectfully submitted that claim 15 now recites structure not taught or disclosed in Ishii—namely, a gas-flow controller uniquely configured to execute inventive control functions. Nowhere does Ishii disclose, teach, or suggest a gas-flow controller as now recited in claim 15.

Moreover, it is further submitted that claim 15 no longer in any way recites an intended use, and that therefore it cannot be argued that Ishii is capable of performing such an intended use. In other words, rather than reciting an intended use of any sort, claim 15 now recites definitive structure to distinguish over the Ishii device.

The rejections of independent claims 19, 22 and 24 are believed to be overcome for the same reasons, set forth above, that the rejection of claim 15 is believed to be overcome, in that the claimed gas-flow controller is likewise recited in claims 19, 22 and 24 to be inter-operative with the mass-flow controllers, and especially configured to carry out inventive control functions.

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In turn, the subject matter of the claims depending from independent claims 15, 19 and 22 can no longer be alleged to be inherent in structure in Ishii, because these claims recite further limitations on the configuration of the parent-claim gas flow controller and other recited controllers. Moreover, inasmuch as claims 16-18, 20 and 21 depend from claims that for the foregoing reasons it is respectfully asserted should be held allowable, these claims should be also held allowable as depending from allowable parent claims.

Accordingly, Applicants courteously urge that, as no further rejections remain to be addressed, this application is in condition for allowance. Reconsideration and withdrawal of the rejections is requested. Favorable action by the Examiner at an early date is solicited.

Respectfully submitted,

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